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Paper 9
Entered: January 14, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INFINERA CORP.,
Petitioner,

v.

CORE OPTICAL TECHNOLOGIES, LLC,
Patent Owner.

Case IPR2018-01259
Patent 6,782,211 B1

Before KEN B. BARRETT, PATRICK M. BOUCHER, and
MATTHEW J. McNEILL, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

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I. INTRODUCTION

A. *Background and Summary*

Infinera Corporation (“Petitioner”) filed a Petition requesting *inter partes* review of U.S. Patent No. 6,782,211 B1 (“the ’211 patent,” Ex. 1001). Paper 2 (“Pet.”). The Petition challenges the patentability of claims 15–18, 23, 25, 30, 32, 33, 35, and 37 of the ’211 patent. Core Optical Technologies, LLC (“Patent Owner”)¹ filed a Preliminary Response to the Petition. Paper 8 (“Prelim. Resp.”).

An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail in establishing the unpatentability of the challenged claims of the ’211 patent. We do not institute an *inter partes* review and the Petition is denied.

B. *Related Proceedings*

One or both parties identify, as matters involving or related to the ’211 patent, *Core Optical Techs., LLC v. Infinera Corp.*, No. 8:17-cv-00548-AG-JPR (C.D. Cal.), *Core Optical Techs., LLC v. Fujitsu Network Commc’ns, Inc.*, No. 8:16-cv-00437-AG-JPR (C.D. Cal.), and *Core Optical*

¹ Petitioner identifies Infinera Corporation as the real party-in-interest. Pet. 82. Patent Owner identifies Core Optical Technologies, LLC as the real-party-in-interest. Paper 4.

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Techs., LLC v. Ciena Corp., No. 8:12-cv-01872-AG-JPR (C.D. Cal.), and Patent Trial and Appeal Board case *Fujitsu Network Commc'ns, Inc. v. Core Optical Techs., LLC*, IPR2016-01618. Pet. 83, Paper 4.

C. The '211 Patent

The '211 patent describes a cross-polarization interference canceler ("XPIC") that enables reconstruction of two optical signals transmitted with generally orthogonal polarization states in the same frequency band. Ex. 1001, 3:10–18. During propagation through an optical fiber, the orthogonality of two optical signal fields is lost to some extent, resulting in cross polarization interference ("XPI") at the receiver. *Id.* at 2:43–48. The XPIC mitigates dispersion effects and loss of optical field orthogonality incurred during propagation through the optical fiber. *Id.* at 1:12–19.

Figure 3 of the '211 patent is reproduced below:

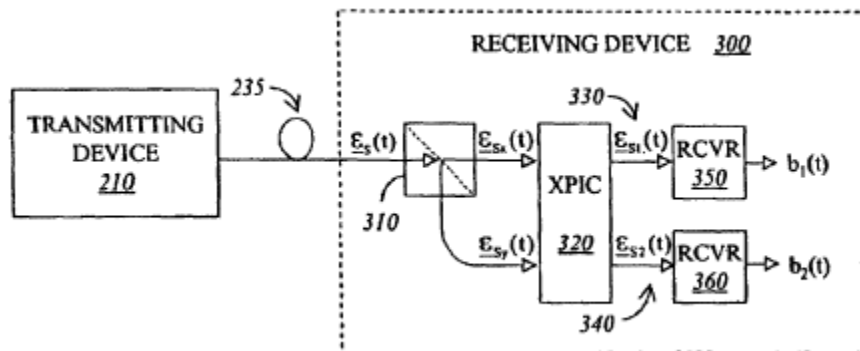


Figure 3 is an illustrative embodiment of a device utilizing an optical XPIC. *Id.* at 7:1–2. Transmitting device 200 produces two modulated optical signals with orthogonally polarized electric fields that are transmitted over optical fiber 235 to receiving device 300. *See id.* at 4:56–66, 5:18–21. The optical system is modeled mathematically using matrices. *See id.* at 5:39–7:57. Receiving device 300 includes polarization beam splitter 310 and

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optical XPIC 320. *Id.* at 7:2–5. Polarization beam splitter 310 separates the received optical signals into its two components, which are processed by XPIC 320. *Id.* at 7:5–9. XPIC 320 may be a diagonalizer that diagonalizes the overall link transmission matrix to eliminate XPI and dispersion effects. *See id.* at 7:58–8:57.

The '211 patent describes additional exemplary embodiments in which the XPIC is implemented optically or electrically. *See id.* at Figs. 5, 6, 9, 4:32–34, 4:45–51. Additionally, the '211 patent describes that the XPIC may provide a minimum mean square error (MMSE) solution, rather than act as a diagonalizer. *See id.* at 16:21–27.

D. Illustrative Claim

Of the challenged claims of the '211 patent, claims 15, 30, 33, 35, and 37 are independent claims. Claim 15, reproduced below, is illustrative:

15. Implemented to receive an incoming optical signal, a receiving device comprising:

 a first polarization beam splitter to separate a received optical signal field of the incoming optical signal into orthogonally polarized components; and

 a cross polarization interference canceler following the first polarization beam splitter, the cross polarization interference canceler comprises a plurality of outputs and a plurality of elements each supporting a transfer function, each output of the plurality of outputs being the sum of at least two element outputs.

Ex. 1001, 24:63–25:6.

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E. Evidence

Petitioner relies on the following prior art references:

Reference	Exhibit No.
R. Cusani <i>et al.</i> , <i>An Efficient Multilevel Coherent Optical System: M-4Q-QAM</i> , 10 J. LIGHTWAVE TECH. 777–786 (1992) (“Cusani 1992”)	Ex. 1006
R. Cusani <i>et al.</i> , <i>A Novel Procedure for Jones’ Parameters Estimation for M-4QAM Optical Systems</i> , 8 EUR. TRANS. ON TELECOMMUNICATIONS (ETT) 191–200 (1997) (“Cusani 1997”)	Ex. 1007
G.J. Foschini, US 4,631,734, issued Dec. 23, 1986 (“Foschini”)	Ex. 1008
M. Kavehrad, <i>Performance of Cross-Polarized M-ary QAM Signals Over Nondispersive Fading Channels</i> , 63 AT&T BELL LAB. TECH. J. 499–521 (1984) (“Kavehrad”)	Ex. 1009
S.T. Hsieh <i>et al.</i> , <i>A Comparison of Three-Diagonalizers, Adaptive Crosstalk Cancellers, in Dual-Polarized M-QAM Systems</i> , 39 IEEE TRANSACTIONS ON COMMUNICATIONS 390–393 (1991) (“Hsieh”)	Ex. 1010
L.D. Tzeng <i>et al.</i> , <i>Polarisation-Insensitive Coherent Receiver Using a Double Balanced Optical Hybrid System</i> , 23 ELECTRONIC LETTERS, 1195–1196 (1987) (“Tzeng”)	Ex. 1022

Petitioner also relies on the Declaration of Dr. Niel Ransom, dated June 14, 2018, (Ex. 1004) in support of its arguments and Patent Owner relies on several declarations in support of its arguments, including: the Declaration of Dr. Russell A. Chipman, dated August 8, 2016, (Ex. 2005); the Declaration of Dr. Joseph M. Kahn, dated December 15, 2016, (Ex. 2011); the Declaration of Dr. Joseph M. Kahn, dated October 16, 2018, (Ex. 2013); and the Declaration of Roberto Cusani, dated October 17, 2018, (Ex. 2017). The parties rely on other exhibits as discussed below.

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F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. ii–v (Table of Contents)):

References	Basis	Claims
Cusani 1992, Cusani 1997, and Kavehrad	§ 103(a)	15, 23, 30, and 32
Cusani 1992, Cusani 1997, and Foschini	§ 103(a)	15, 25, 30, and 33
Cusani 1992, Cusani 1997, Foschini, and Tzeng	§ 103(a)	16–18
Cusani 1992, Cusani 1997, and Hsieh	§ 103(a)	35 and 37

II. ANALYSIS

A. The Level of Ordinary Skill in the Art

Petitioner’s declarant, Dr. Ransom, opines that:

A person of ordinary skill in the art related to the ’211 patent at the time of the earliest claimed filing date of the ’211 patent would have at least a master’s degree in electrical engineering or physics, or an equivalent field, and at least two years of professional or research experience in the field of optical communications systems. Additional graduate education could substitute for professional experience, or significant experience in the field of optical communications systems could substitute for formal education.

Ex. 1004 ¶ 110; *see* Pet. 6. Patent Owner relies on the testimony of Dr. Chipman, who similarly opines that the person of ordinary skill would have a master’s degree and “at least 2 to 5 years of experience working as an engineer (or equivalent experience such as Ph.D. level work or research) in the optical communications field with substantial amount of that experience focused on fiber optic signal processing.” Ex. 2005 ¶ 27; *see* PO Prelim. Resp. 11 (citing Ex. 2005 ¶¶ 24–37).

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We discern no material difference between the two experts' definitions. For purposes of this decision, we apply Dr. Ransom's description of the person of ordinary skill in the art.

B. Claim Construction

Typically, in an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2018)²; *see also* *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

However, “[a] party may request [in the form of a motion] a district court-type claim construction approach to be applied if a party certifies that the involved patent will expire within 18 months from the entry of the Notice of Filing Date Accorded to Petition.” 37 C.F.R. § 42.100(b). In this proceeding, Patent Owner filed such a motion certifying that the ’211 patent will expire within 18 months from the entry of the Notice of Filing Date Accorded to Petition, and specifically on November 4, 2019, and requesting a district court-type claim construction. Paper 5. Petitioner did not oppose Patent Owner’s motion, and we granted the unopposed motion.

² A recent amendment to this rule does not apply here because the Petition was filed before November 13, 2018. *See* “Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board,” 83 Fed. Reg. 51340, 51340 (Oct. 11, 2018) (“DATES”).

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Paper 7; *see* Prelim. Resp. 11. In applying a district court-type construction, we construe a “claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” “Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board,” 83 Fed. Reg. 51340, 51343 (Oct. 11, 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The Federal Circuit recently explained that “[i]n many cases, the claim construction will be the same under the *Phillips* and BRI [broadest reasonable interpretation] standards.” *In re CSB-Sys. Int’l, Inc.*, 832 F.3d 1335, 1341 (Fed. Cir. 2016).

The ’211 patent has been the subject of at least three claim construction decisions in some of the related proceedings identified above. Those decisions were rendered, chronologically, in the *Ciena* District Court litigation (Ex. 1019), the *Fujitsu* IPR (Ex. 2001), and, most recently, the parallel, co-pending *Infinera* District Court litigation (Ex. 1018). *See* Prelim. Resp. 3–5; Pet. 18–20.

Petitioner lists the District Court’s constructions in the co-pending litigation, but does not propose that we adopt those constructions. Pet. 18–20.³ Rather, Petitioner implies that the Court’s constructions are different than Petitioner’s applied constructions here. *See, e.g., id.* at 20 n.2 (referring to the situation “[s]hould the Board adopt the District Court’s constructions” presumably as opposed to Petitioner’s BRI position). Petitioner proposes an

³ Unless indicated otherwise, our references to the “District Court” pertain to the current, parallel litigation in the *Infinera* case, as opposed to the earlier *Ciena* or *Fujitsu* District Court cases.

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explicit claim construction only for the phrase “cross polarization interference” (“XPI”), and contends that, “[f]or the remaining terms in the Challenged Claims, including those [construed by the District Court], no specific construction is necessary under the BRI.” *Id.* at 20.

Patent Owner argues that Petitioner has failed to comply with 37 CFR § 42.104(b)(3) and (4), the rule provisions requiring a petition to contain an explanation as to how the challenged claim should be construed and how the claim so-construed is unpatentable. Prelim. Resp. 57–59; *see id.* at 4 (asserting that Petitioner has shifted the burden to the Board). For the reasons that follow, we agree.

Cross Polarization Interference (XPI)

As for the phrase “cross polarization interference” or “XPI,” Petitioner proposes a construction broader than that arrived at by the Board under BRI in the previous IPR and by the District Court under *Phillips*. Those previous constructions consistently construed the subject interference as involving the loss of orthogonality. Ex. 2001, 7 (Board); Ex. 1018, 11–12 (the District Court noting that the Board’s conclusion that XPI “should be understood more narrowly as crosstalk resulting from the loss of orthogonality” “is consistent with the Court’s review of the record.”). Petitioner asserts here, as it did unsuccessfully before the District Court, that XPI should be construed to broadly involve “one or more of loss of orthogonality of the two optical signals, differential phase retardation, polarization dependent loss, rotation of the signals, etc.” Pet. 21; *see* Ex. 1018, 8, 10–11 (Infinera’s proposed broad construction before the District Court and the rejection thereof). Because, for the reasons discussed below, the Petition is otherwise flawed, we need not decide whether

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Petitioner prevails in this latest attempt to obtain a broader construction of XPI.

Cross Polarization Interference Cancellor (XPIC)

The phrase “cross polarization interference canceller,” or “XPIC,” appears in most of the challenged independent claims,⁴ and, therefore, its meaning is implicated in Petitioner’s arguments as to why the challenged claims allegedly are unpatentable. The phrase has been construed at least three times prior, listed chronologically as follows.

1) In the *Ciena* District Court litigation:

circuitry, optical components, and/or software to reconstruct two signals that were *optically* transmitted with generally orthogonal polarization states.

Ex. 1019, 16 (adopting Plaintiff/Patent Owner’s proposal) (emphasis added).

2) In the prior (*Fujitsu*) IPR:

circuitry, optical components, and/or software to reconstruct two signals, which were transmitted with generally orthogonal polarization states, *to mitigate XPI*.

Ex. 2001, 8 (adopting much of Patent Owner’s proposal but declining the request to include the “optically” term) (emphasis added).

3) In the co-pending *Infinera* District Court litigation:

Function: canceling cross polarization interference

Structure: the following embodiments and equivalents thereof:

1. An algorithm consistent with Figures 4A, 4B, 10A, or 10B, which satisfies Equations C.6, E.52, or E.76

⁴ Challenged independent method claim 33 recites “mitigating cross polarization interference” but does not explicitly recite the word “canceler.” Challenged independent method claim 37 recites a “diagonalizer cross polarization interference cancellation network” rather than an XPIC.

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- (’211 Patent at 4:21–22; 7:60–8:32; 8:16–32; 9:1–6; 18:30–31; 21:48–60; 23:28–46);
2. Four independent optical, microwave, independent baseband analog electronic, or baseband digital electronic filters (as shown in Figure 4A, 4B, 10A, and 10B) having transfer functions $w_{ij}(\omega)$ or W_{ij} satisfying Equation C.6 with/without frequency dependence (ω) (’211 Patent at 8:16–32; 8:58–67; 9:1–6; 10:30–33; 23:28–46);
 3. Four independent complex elements (as shown in Figure 4B) having transfer functions w_{ij} satisfying Equation C.6, without frequency dependence (ω) (’211 Patent at 8:16–32; 9:1–6); and
 4. Four independent complex elements (as shown in Figure 4B) having transfer functions w_{ij} satisfying Equation E.52 or E.76 (’211 Patent at 8:58–67; 10:30–33; 16:34–36; 18:30–31; 21:48–60; 23:11–12).

Ex. 1018, 16–17 (construing the phrase as a means-plus-function limitation as requested by Defendant/Petitioner along with additional corresponding structure identified by Plaintiff/Patent Owner).

It is Petitioner that advocated for and obtained in the District Court a construction of XPIC as a means-plus-function limitation governed by 35 U.S.C. § 112 ¶ 6.⁵ Ex. 1018, 13–17; *see id.* at 16–17 (the Court adding to Infinera’s “too narrow” proposed construction additional embodiment(s) as corresponding structure under § 112 ¶ 6). Before us, Petitioner declines to advocate for that means-plus-function construction but, as mentioned, maintains, for XPIC, that “no specific construction is necessary under the

⁵ The District Court similarly determined that “diagonalizer cross polarization interference cancellation network” of claim 37 is a means-plus-function limitation. Ex. 1018, 18–19.

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BRI.” Pet. 20 (footnote 2 omitted). Petitioner, however, also does not reject the Court’s means-plus-function construction, asserting that:

Should the Board adopt the District Court’s constructions, the prior art cited in this Petition would nevertheless render the challenged claims unpatentable for the reasons set forth below. Petitioner has included in its grounds for review sufficient citation to prior art references that teach the claim limitations regardless of the final claim construction adopted by the Board.

Id. at 20 n.2; *see also id.* at 39 n.5 (“In addition, should the Board also adopt the district court’s means-plus-function construction for XPIC, the Cusani 1992-Cusani 1997-Kavehrad combination teaches at least an equivalent to embodiment 2 for each claim in Ground 1.”).

Patent Owner argues, as it did before the District Court (Ex. 1018, 13), that XPIC is not a means-plus-function limitation, and Patent Owner presents to us the argument that the District Court’s construction is erroneous. Prelim. Resp. 26. In contrast to Petitioner’s position, Patent Owner offers a lengthy discussion of the purported meaning of XPIC. *See id.* at 26–32. Thus, we have before us a claim construction from the District Court that the Patent Owner asserts is erroneous but that Petitioner acknowledges could be adopted by the Board in analyzing Petitioner’s challenges.

In addition to the three above-listed constructions, Petitioner’s patentability arguments suggest two more implied proposed constructions for XPIC, notwithstanding Petitioner’s position that XPIC needs no “specific” construction (Pet. 20). The implied constructions are based on the possible interpretations of “cross polarization interference” as discussed above. For example, Petitioner argues that an XPIC is taught by the combination of two Cusani references if XPI is broadly interpreted to

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encompass rotation-based interference or, if XPI is construed to involve interference due to loss of orthogonality, “Kavehrad directly addresses correction of the loss of mutual orthogonality.” *Id.* at 35, 39. Thus, Petitioner may be implying that an XPIC is either 1) any structure that corrects rotation-based interference, or 2) any structure that “addresses correction of the loss of mutual orthogonality.” *See id.* at 39. However, as mentioned, Petitioner has declined to set forth explicitly such a construction for XPIC in the Petition.

A petition for an *inter partes* review must identify how each challenged claim is to be construed and how the construed claim is unpatentable. 37 C.F.R. § 42.104(b)(3), (4). Additionally, where a claim contains a means-plus-function limitation, “the construction of the claim must identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function.” 37 C.F.R. § 42.104(b)(3).

This is not the first time that the ’211 patent has been before a tribunal. It cannot be said that Petitioner is unaware of the important claim construction matters that go to the heart of dispositive patentability issues. Petitioner, on the facts of this case,⁶ has failed to identify adequately its proposed construction applicable to its patentability challenges. Further, Petitioner cannot avoid its duty to comply with Rule 104(b)(3) by merely

⁶ We do not purport to establish a standard applicable for all cases. In certain situations, it may be acceptable, for example, for a petitioner to advance arguments under alternative claim constructions or to argue that an explicit construction is not necessary because a clearly and unambiguously articulated combination of teachings renders unpatentable a claim under the possible constructions. Those exemplary situations are not present here.

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inviting us to apply a means-plus-function interpretation rather than affirmatively advocating (in this forum) the application thereof. Petitioner has neither taken a definitive position nor provided complete briefing, and we decline to assume Petitioner's task of fully analyzing the claim construction for XPIC. Petitioner's failure in this regard is reason enough to deny the petition.

C. The Articulation of a Proposed Combination of References' Teachings

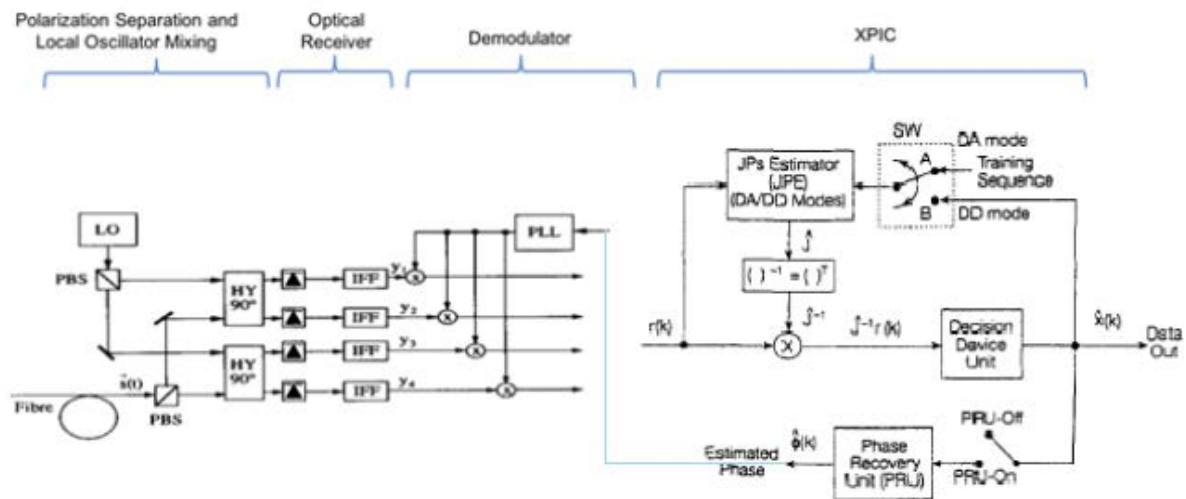
Petitioner alleges that claims 15, 23, 30, and 32 of the '211 patent would have been obvious over Cusani 1992, Cusani 1997, and Kavehrad. *See* Pet. 26–52. We begin by discussing Petitioner's challenge to independent apparatus claim 15, which recites a receiving device comprising a polarization beam splitter and a cross polarization interference canceler. Ex. 1001, 24:63–25:6.

Cusani 1992 describes a coherent multilevel optical transmission system. Ex. 1006, 4. Petitioner contends that “Cusani 1992 discloses the core elements of the claimed receiving device” by disclosing the separation of two orthogonal component signals and routing those signals through a canceller. Pet. 26. The combination of Cusani 1992 and Kavehrad was asserted in the prior IPR, and institution was denied because the petitioner had not established that the Jones matrix of Cusani 1992 corrects for a loss of orthogonality (XPI, as-construed in that IPR) and therefore the petitioner had not established that the reference discloses the claimed XPIC. Ex. 2001, 12. Institution also was denied because the petitioner had not explained sufficiently why a person would have combined the references' teachings. *Id.* at 13–14.

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In this case, Petitioner relies also on Cusani 1997 (Ex. 1007), asserting that Cusani 1997 builds on the teachings of and cites to Cusani 1992 and that Cusani 1997 describes cross-polarization interference as a basic problem. Pet. 28. Petitioner describes, as a material difference between the references, how the “Jones matrix estimator” calculates its coefficients. *Id.* at 29. Petitioner provides the following to depict the combination of the two Cusani references.



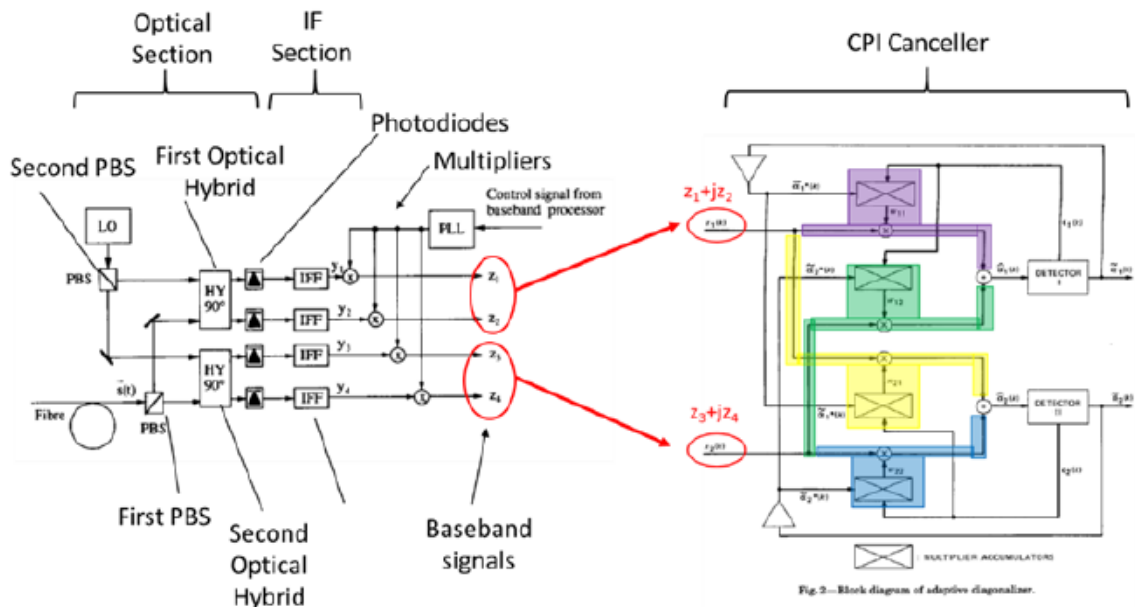
Pet. 30 (citing Ex. 1004 ¶ 150). The above figure depicts an annotated combination of, on the left, the optical front end of Cusani 1992 (Ex. 1006, 7 (Fig. 3)) and, on the right, the polarization control system of Cusani 1997 (Ex. 1007, 5 (Fig. 1)), which Petitioner labels as an XPIC. Petitioner contends that this two reference combination corrects for rotation-based interference, but not for loss of orthogonality. *See* Pet. 39.

Petitioner further contends that Kavehrad has an XPIC that corrects for loss of orthogonality and proposes “[i]ncorporating Kavehrad’s XPIC . . . into the Cusani 1992 and Cusani 1997 system.” *Id.* at 30 (section heading with emphasis omitted). Petitioner asserts that “a combination of Kavehrad

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with the teachings of the Cusani references, and specifically with the front end of the receiver described in Cusani 1992, would be depicted as follows:”



Pet. 34 (citing Ex. 1004 ¶ 156). The above figure depicts an annotated combination of, on the left, the optical front end of Cusani 1992 (Ex. 1006, 7 (Fig. 3)) and, on the right, the adaptive Least-Mean-Square (LMS) baseband canceler of Kavehrad (Ex. 1009, 9–10 (Fig. 1)), which Petitioner contends is an XPIC (*see* Pet. 31).

Petitioner, in addressing the challenged claims, breaks up for analysis, certain limitations into small phrases which are then addressed in isolation. This multiplies the possible permutations of proposed combinations and modifications. For example, independent apparatus claim 15, as mentioned, recites two structures—a beam splitter and a XPIC. Petitioner’s analysis breaks the XPIC limitation into three separate parts (designated 15.b, 15.c, and 15.d), and then for each part identifies two or three references that purportedly teach the part of the limitation but Petitioner does not identify clearly and adequately the specific teaching that is utilized in Petitioner’s

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proposed overall combination. Pet. 36–45. The number of possible asserted combinations is further multiplied by the overlay of the multiple potential claim constructions discussed above. Illustratively, Petitioner provided the depictions shown above of what appears to be two different two-reference combinations—one depicting the combination of Cusani 1992 with the purported XPIC of Cusani 1997, and one depicting the combination of Cusani 1992 and the purported XPIC of Kavehrad. As a reminder, Petitioner’s ground is articulated as a three-reference ground. However, Kavehrad is not included in the first depicted combination and Cusani 1997 appears to be missing from the second depicted combination. For part 15.b of the XPIC limitation, Petitioner utilizes the different combinations in an effort to address different possible constructions for the XPIC term. *See* Pet. 39. Not stopping there, Petitioner includes a footnote making the conclusory assertion, without supporting citation, that “should the Board also adopt the district court’s means-plus-function construction for XPIC, the Cusani 1992-Cusani 1997-Kavehrad combination teaches at least an equivalent to embodiment 2 for each claim in Ground 1.” *Id.* at 39 n.5.

A key issue in this case is whether the use of the claimed XPIC in an optical system would have been obvious. In order to even begin that analysis, we must understand which elements Petitioner proposes to combine and how those are proposed to be combined. In other words, Petitioner must clearly identify the proposed configuration of its challenge. As mentioned, Petitioner breaks the XPIC limitation of claim 15 into three parts. For part 15.c—reciting “the cross polarization interference canceler comprises a plurality of outputs and a plurality of elements each supporting a transfer function”—Petitioner identifies teachings in each of Cusani 1992,

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Cusani 1997, and Kavehrad. *See* Pet. 42–45. This does not allow us to understand which specific teachings are being applied in the proposed combination. Furthermore, the reliance on Cusani 1992 to teach XPIC matrix elements is confusing because Petitioner’s two depictions above imply that the canceler of Cusani 1992, and thus its matrix, is *not* used in the combination.

Similarly, for part 15.d—reciting “each output of the plurality of outputs being the sum of at least two element outputs”—Petitioner asserts that each of Kavehrad and Cusani 1997 teach addition or summing but Petitioner does not specify which teaching is used or how it is used in the proposed combination.

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). “Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011).

Petitioner’s analysis in many places is little more than an assertion that each particular element of a larger limitation was individually known in the prior art. Petitioner does not describe adequately a specific proposed combination of references. Because of this and in light of, at least, the massive number of possible proposed combinations, Petitioner has failed to identify adequately how each challenged claim is to be construed and how the construed claim is unpatentable. 37 C.F.R. § 42.104(b)(3), (4).

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Petitioner's positions throughout the remainder of the Petition suffer from the same or similar defects. *See, e.g.*, Pet. 56–60 (Ground 2: asserting that Cusani 1992, Cusani 1997, and Foschini each disclose each part of the XPIC limitation); *id.* at 64–65 (Ground 3: incorporating by reference the discussion from the underlying Ground 2); *id.* at 75 (Ground 4: arguing that limitation part 35.c is taught by the combination of “Ground 1 Cusani 1992 and Cusani 1997 alone” or, “[s]hould the Board reject Petitioner's XPI construction, Hsieh considers and corrects for loss of orthogonality.”). In Ground 3 (Cusani 1992-Cusani 1997-Foschini-Tzeng), Petitioner asserts, in a footnote, yet another possible combination involving the substitution of the Ground 1 combination as the “base to which Tzeng is combined.” Pet. 65 n.9. As Patent Owner notes (Prelim. Resp. 60), Ground 4 does not include Kavehrad in the identification of the ground yet Petitioner repeatedly and confusingly refers to the teachings of Kavehrad in that ground. *See* Pet. 72–74.

Because Petitioner has failed to articulate adequately and specifically a proposed combination of references' teachings, Petitioner has not demonstrated a reasonable likelihood of prevailing in its obviousness challenges.

D. Reasoning to Combine the Two Cusani Optical System References with the Radio Frequency System References

For an obviousness analysis, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR*, 550 U.S. at 418. Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated

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reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (cited approvingly in *KSR*, 550 U.S. at 418). Petitioner has not articulated adequately a reason why one of ordinary skill in the art would have combined the references’ teachings to arrive at the claimed subject matter.

The ’211 patent pertains to cancelling interference incurred during transmission via optic fiber, including interference in the form of loss of orthogonality. *See* Ex. 1001, 1:10–19, 2:43–45. For a teaching of components addressing a loss of orthogonality, Petitioner relies on references pertaining to radio frequency (“RF”) communications rather than optical fiber. Pet. 32 (Ground 1: “techniques from radio frequency references such as Kavehrad”), 53 (Grounds 2 and 3: “Foschini, like Kavehrad, discloses an XPIC for use in a dual polarization radio system.”), 74 (Ground 4: “Hsieh’s teaching from a radio frequency (RF) system”).

Patent Owner argues that Petitioner has not included an adequate basis to conclude that a person of ordinary skill in the art of the ’211 patent would have combined optical components with radio system components, and refers to the differences in physics between optical fiber communications and RF communications. Prelim. Resp. 10 (citing Ex. 2013 ¶¶ 12–39), 35–36. Patent Owner also maintains that Petitioner has failed to demonstrate that a person of ordinary skill in the art would have had a reasonable expectation of success for the combination of optical and RF components. *Id.* at 35–36. Patent Owner’s declarant, Dr. Kahn, testifies that a person of ordinary skill in the art at the time of the invention “would have understood that the physics governing how optical signal polarization is affected by propagation through an optical fiber (the domain of the Cusani papers) is

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entirely different from the physics governing how radio signal polarization is affected by propagation through a radio channel,” and elaborates on this opinion. Ex. 2013 ¶ 18. Patent Owner notes that, in the prior IPR, it argued and Dr. Kahn testified regarding the obstacles in combining the same radio references with the receiver structure of Cusani, and argues that this testimony stands unrebutted by Petitioner. Prelim. Resp. 54 (citing Ex. 2004, 61–67; Ex. 2011 ¶¶ 90–98, 101, 110–113, 115, 124–127, 130).

We agree that Petitioner has not made a requisite threshold showing to merit institution of a review. *See, e.g.*, Pet. 27–24 (Ground 1), 53–55 (Ground 2), 64–66 (Ground 3, incorporating by reference the reasoning for the underlying Ground 2), 72–74 (Ground 4). Petitioner’s reasoning is an oversimplification and too conclusory to constitute the necessary articulated reasoning with rational underpinning. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

Petitioner’s reasoning⁷ includes the assertion that the references relate to the same field of endeavor of the ’211 patent, which Petitioner defines broadly as “communications systems with an emphasis on polarized signals, and mitigating impairments of modulated signals through a transmission channel.” Pet. 28 n.4; *see also id.* at 53 (Ground 2). Even if correct, that would only support a finding that the references are analogous art, not that there is a reason to combine the teachings.

Petitioner maintains that loss of orthogonality was a known issue in optical systems, and that one of ordinary skill “would have looked to

⁷ We have considered all of Petitioner’s reasoning as set forth in the Petition. Our discussions here are limited to certain examples.

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additional teachings in order to implement a more robust XPIC to account for this additional form of interference.” Pet. 31 (citing Ex. 1004 ¶151; Ex. 1025, 3; Ex. 1032, 3). Petitioner contends that Kavehard utilizes a matrix similar to “Cusani” and therefore its use in optical systems would have been a routine design choice in that the use of transmission matrices was “commonplace.” *Id.* at 31–32 (citing Ex. 1004 ¶ 153); *cf. id.* at 54 (similar reasoning to in the context of Foschini, that the references each disclose cancelation matrices); *id.* at 55 (“[A] POSITA would have found it routine and straightforward to implement Cusani’s XPIC using complex matrix coefficients [of Foschini.]”); *see Cutsforth, Inc. v. MotivePower, Inc.*, 636 F. App’x 575, 578 (Fed. Cir. 2016) (nonprecedential) (“Merely stating that a particular placement of an element is a design choice does not make it obvious.”).

The cited expert testimony repeats this conclusory argument without elaboration. This argument is little more than an assertion that it was known to use matrices in signal processing and is an oversimplification. Petitioner concedes that there is a material difference between how the matrices are used to calculate coefficients in the two Cusani optical systems. Pet. 28 (“The only material difference between the two [Cusani optical system] controllers is *how* the Jones matrix estimator calculates its coefficients.”). Where there is a material difference even between two closely related optical systems and where Petitioner does not elaborate adequately regarding the “design choice” assertion, we are not persuaded that Petitioner has shown a likelihood of demonstrating that it would have been a routine design choice or routine and straightforward to use a radio frequency system matrix in an optical system.

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Petitioner further argues that using radio frequency techniques in optical communications “would have been well understood.” Pet. 32 (citations omitted). In support, Petitioner cites to documents that contain forms of the words “optical” and “radio” in close proximity. For example, Petitioner cites, without elaboration, to an optical system patent that states that a certain type of *transmission* system was well known in RF communications. Pet. 32 (citing Ex. 1021, 1:13–17); *see id.* (arguing that a combination would have been obvious because of “similarities between dual-polarization optical and radio *transmission*” (emphasis added)). This, again, is an oversimplification as the key issues involve the specific techniques used to cancel specific types of interference of *received* signals in optical systems versus radio frequency systems. Demonstrating obviousness in this case requires more than a showing that optical and RF systems both utilize general techniques related to orthogonally polarized signals and had known interference problems.

As to the assertion of no unexpected results, one of Petitioner’s arguments appears to be that the four outputs of the front end of Cusani 1992 are compatible with the two inputs of Kavehrad’s purported XPIC. *See* Pet. 32–34. This goes to whether the references devices are physically combinable but does not persuade us of a likelihood of demonstrating that the use of a radio frequency matrix in an optical system would yield predictable interference cancelation results.

III. CONCLUSION

Petitioner has not demonstrated that there is a reasonable likelihood of establishing the unpatentability of any of claims 15–18, 23, 25, 30, 32, 33, 35, and 37 of the ’211 patent.

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IV. ORDER

For the foregoing reasons, it is
ORDERED that the Petition is *denied* as to the challenged claims, and
no trial is instituted.

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